

## FOLDING TABLE

### Background of the Invention

#### Field of the Invention

5        The present invention relates to folding tables, and more particularly to folding tables having advantageous tabletop shapes and/or having lock assemblies that secure the folding tables in a storage position.

#### Prior Art

In large multi-purpose rooms that are utilized at various times as dining rooms, meeting halls, dance areas and the like, it is often desirable that multi-purpose furniture be used. This furniture normally includes, for example, tables, chairs, benches, and stools. Such furniture provides added utility if it is of the folding type, so as to require minimum storage space. Folding tables having accompanying stools or benches are well known to provide seating and table space while requiring a relatively small amount of storage space. Such folding tables generally fold along a centerline, and have benches or stools placed along both sides of the table. Examples of folding tables are shown in U.S. Pat. Nos. 2,771,937 to Wilson, 3,075,809 to Wilson, 3,099,480 to Wilson, 4,133,271 to Carlson, 4,932,333 to Jensen, 6,065,802 to Bue, 6,254,178 to Bue, and 6,386,628 to Bue. All of the above-listed patents are assigned to Sico, Inc., the assignee of the present invention. Although such tables are successful in providing folding furniture, still further improvements are possible. A challenge specific to folding tables is maintaining satisfactory stability, especially when folded, while also minimizing the table footprint for storage.

A number of prior art folding tables rely on torsion springs to keep the tables from unfolding (e.g., 4,932,333 to Jensen). A difficulty with relying on torsion bars to keep the table folded in a proper storage position is that the bars may not apply enough torque to

ensure that the table does not spontaneously unfold, or they can apply too much torque and lead to over-folding. Designing a table with the correct number of torsion bars that apply the right about of torque is difficult. Moreover, some older systems require an additional step of manually locking the table in the storage position. Prior tables have not provided an  
5 uncomplicated lock system that allows simple and easy actuation and release. Prior art tables also required tools for initial setup of the lock and it was possible to circumvent installation of some lock systems. Therefore, a lock system is needed that is simple and easy for the end user to set up without requiring tools. Moreover, installation of a lock should be compulsory and not optional. The present invention addresses these and other problems associated with  
10 folding tables.

### Summary of the Invention

The present invention is directed to a folding table with a locking mechanism that automatically locks the folding table in a preferred storage position. The folding table includes a pair of semi-oval shaped tabletop sections that fold along a folding axis defined by  
15 the straight edges of each semi-oval shaped tabletop section. The tabletop sections are attached to a support structure that includes a retractable substructure that supports a number of evenly spaced stools. In a preferred embodiment, the semi-oval tabletops have a length greater than their width and the stools are substantially evenly spaced along the tabletops.

The foldable table has three noteworthy positions including a use position, a  
20 transport/storage position, generally referred to as a storage position, and a shipping position. The use position, or "first position," is the position in which the tabletop sections and stools are in a plane substantially parallel with the ground. The storage position, also known as the "second position" or "folded position," represents an orientation wherein the bottom surfaces of the tabletop sections are substantially facing one another, but are not parallel to each other.  
25 Rather, in the storage position, the tabletop sections form an acute angle with respect to each other. The preferred angle represents a balance between space saving and stability (if the angle is too small, the folding table become increasingly susceptible of being tipped over).

The shipping position, or "third position" is the most compact of the three positions. In the shipping position, the bottom surfaces of the tabletop sections face each other and are substantially parallel. This is the preferred position for shipping since saving space is essential, while having the ability to stand without support is generally not important during

5 shipping.

In particular, the present invention relates to a lock assembly that automatically engages and secures the folded table at a predefined preferred storage position. More specifically, once the folding table reaches the storage position, the lock assembly engages to prevent the folding table from over-folding and thereby becoming vertically unstable. In

10 addition, once engaged, the lock assembly prevents the table from spontaneously unfolding. To unfold the table and deploy it for use, the operator must disengage the locking member, also referred to as the "latching member," from the engagement member, and also referred to as the "catch" or "complementary member." Preferably, disengagement of the locking member is accomplished by simply rotating a handle provided as part of the lock assembly.

15 Another feature of the lock assembly is that it does not make shipping the folding table more difficult. Although, when operational, the lock assembly does prevent the table from inadvertently being placed in the shipping position, the lock assembly can be temporarily disengaged only for shipping purposes. Depressing a spring-loaded detent, also referred to as a "spring lock," that is provided as part of the lock assembly, allows the tabletops to be folded

20 to the shipping position. However, the location of the detent is not prominent, so that the detent is not inadvertently disengaged.

These features of novelty and various other advantages that characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained

25 by its use, reference should be made to the drawings which form a further part hereof, and to the accompanying descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

### **Brief Description of the Drawings**

Referring now to the drawings, wherein like reference letters and numerals indicate corresponding structure throughout the several views:

5 FIG. 1 shows a perspective view of a folding table and seating structure in a use position according to the principles of the present invention;

FIG. 2 shows a front elevational view of the folding table shown in FIG. 1;

FIG. 3 shows a top plan view of the folding table shown in FIG. 1;

FIG. 4 shows an end elevational view of the folding table shown in FIG. 1;

10 FIG. 5 shows a bottom plan view of the folding table shown in FIG. 1;

FIG. 6 shows a sectional view of the lock assembly of the folding table shown in FIG. 1;

FIG. 7 shows a enlarged fragmentary bottom plan view of the lock assembly of folding table shown in FIG. 1;

15 FIG. 8 shows an enlarged fragmentary front elevation view of the folding table shown in FIG. 1 in a storage position with lock assembly engaged;

FIG. 9 shows an enlarged fragmentary front elevation view of the folding table shown in FIG. 1 in a storage position with lock assembly disengaged;

20 FIG. 10 shows an enlarged fragmentary front elevation view of the folding table shown in FIG. 1 in a shipping position;

FIG. 11 shows a diagrammatic view of the folding table shown in FIG. 1 in a shipping position; and

FIG. 12 shows a top plan view of the folding table shown in FIG. 1 with table legs removed to accommodate wheel chairs.

#### **Detailed Description of the Preferred Embodiment**

5 Referring now to the drawings, and in particular, FIG. 1 a folding table 10 is shown in a use position. The folding table 10 includes a pair of opposed tabletop sections 20 with a foldable table supporting structure 30. The foldable table support structure 30 includes a plurality of mounting rails 40, that preferably mount to the underside of the tabletop sections 20, a plurality of table legs 50 pivotally attached to the plurality of mounting rails 40, and a  
10 storage lock assembly 60 that locks the table support structure 30 in the storage position when the mounting rails are brought into the storage position.

It should be appreciated that the term “folding linkage” as used in this application collectively refers to the set of structural members of the table support structure 30 that are pivotally connected to other structural members including, for example, the table legs 50  
15 discussed below. It should also be appreciated that the term “framework” as used in this application refers to supporting members that are attached to the tabletops including, for example, the mounting rails 40 discussed below and numerous other support members and fasteners that are shown throughout the figures, but are not designated by specific reference numerals.

20 Referring to FIGS. 1, 3, and 5, the pair of opposed tabletops 20 include a first tabletop portion 22 on a first folding table assembly 12 and a second tabletop portion 24 on a second opposed folding table assembly 14 that together preferably forms a generally oval shape having a greater length than width. The first tabletop portion 22 includes a top surface 26 and a bottom surface 28. Likewise, the second tabletop 24 portion includes a top surface 25 and a  
25 bottom surface 27.

A plurality of mounting rails 40 are attached to the bottom surface 28 and 27 of the opposed tabletops 20. Preferably, the plurality of mounting rails 40 at least includes a first mounting rail 42 that attached parallel, but offset from, the longitudinal axis 41 of the tabletop sections 20, and a second mounting rail 44 attached parallel and offset from the first mounting rail 42 on the opposite side of the longitudinal axis 41. The mounting rails 40 define a number of table leg attachment locations 46. The attachment locations 46 define a plurality of evenly spaced pairs of aligned through holes 47 that pivotally connect a plurality of table legs 50. Though a foldable table 10 having six table legs 50 is shown, it should be appreciated that the number of table legs 50 can vary so long as the foldable table 10 includes at least two table legs 50.

Referring to FIGS. 1, 2, 4 and 5, table legs 50 include a first support leg portion 52 on a first side of the longitudinal axis 41, a second support leg portion 54 on a second side of the longitudinal axis 41, one or more struts 56 connected to the plurality of mounting rails 40, at least one brace bar 58 connected to the support leg portions 52 and 54, and a plurality of seat or stool supports 51 connected to the support leg portions 52 and 54. Each support leg portion 52 and 54 is constructed to be vertical when the foldable table 10 is in the use position. The one or more struts 56 pivotally connect to the mounting rails 40 though one or more pairs of aligned holes 47, at the attachment locations 46 of parallel mounted first and second mounting rails 40. Within the struts 56 are torsion springs 53 that are constructed to exert a torque between the first and second mounting rails 42 and 44 and the table legs 50 in a direction that facilitates folding the F table 10, (i.e., moving the table 10 from the use position to the storage position.)

Attached to one end of the seat supports 51 are stools 55 that are substantially evenly spaced along the opposed side of the folding table 10 so that a number of people may sit at the table 10 without encroaching upon one another's space. More specifically, the space between each stool 55 is wide enough so that there is sufficient room for passage between the stools 55 with no obstruction from the support frame structure 30. In addition, the semi-oval tabletop sections 20 define a tabletop that allows a standard cafeteria tray to be positioned

longitudinally in front of each person seated at the folding table 10. Attached on the opposite ends of some of the seat supports 51 are caster wheels 57. The caster wheels 57 support the folding table 10 when the folding table 10 is in the storage position and allows for easy transport thereof.

- 5 Referring to FIG. 12, it is contemplated that one or more of the table legs 50 may be removed to provide additional spaces there between in order to accommodate access to the table via a wheel chair.

Referring to FIGS. 1, 2, 5, 8, 9 and 10, the folding table support structure 30 includes a plurality of support linkage members 32 constructed to prevent the table legs from pivoting 10 while the table is in the use position. The support linkage members 32 include a first support linkage 34 that is pivotally attached to table legs 50 of the first folding table assembly 12 of the support structure 30 and a second support linkage member 36 that is pivotally attached to table legs 50 of the second folding table assembly 14 of the support structure 30. When the folding table 10 is moved between the use position and the storage position (i.e., folded about 15 a transverse axis 39), the support linkages 34 and 36 retract the table legs 50 so that the folding table 10 can be conveniently stored.

Referring to FIGS. 6-9, the storage lock assembly 60 includes a locking member or latching member 62, a locking catch, also known as an engagement member, a catch, or a complementary member, 64, handles 66 and 67, and a pivot 70. The locking member 62 connects to the pivot 70, which is pivotally connected to a pair of mounting rails 40 of the second folding table assembly 14. The locking catch 64 is attached to a support linkage 34 of the first folding table assembly 12. The locking member 62 includes a stop 68 and is attached to handles 66 and 67 that are on opposite sides of the longitudinal axis 41. The stop 68 and the handles 66 and 67 are constructed to interfere with the bottom surface 27 of the 20 second tabletop portion 24 to limit the range in which the pivot 70 can rotate. Limiting the range of rotation ensures that the locking member 62 stays in alignment with the lock catch 64 for automatic engagement when the folding table 10 is moved into the storage position. In 25

addition to limiting the rotational range of the pivot, the handles 66 and 67 serve as structures that an operator can conveniently rotate to unlock the folding table 10 from its storage position.

Preferably, the locking member 62 includes a curved or angled first portion 65 for

- 5 engaging the locking catch 64 and aligning itself with the locking catch 64 such that a locking portion otherwise known as a hook portion 63 automatically locks onto the locking catch 64.

In the preferred embodiment the locking catch 64 includes a conventional bolt that is retained by the hook portion 63.

As shown in FIG. 6 and 7, preferably, the pivot 70 includes a cross bar 72 that is

- 10 housed within a sleeve 74. The sleeve 74 pivotally connects to a pair of aligned though holes 47 in the first and second mounting rails 42 and 44. The handles 66 and 67 are rigidly attached to the cross bar 72 and the locking member 62 is rigidly attached to the sleeve 74.

Housed within the cross bar is a spring lock, otherwise known as the "spring loaded detent," 76 that engages both the cross bar 72 and the sleeve 74 and prevents relative motion there

- 15 between. As discussed above, the handles 66 and 67 and the stop 68 of the locking member 62 together limits the rotational range of the pivot. As mentioned above, this feature is desired because it automatically aligns the locking member 62 relative to the locking catch 64. More specifically the limited rotational range of the pivot ensure that the curved or angled portion 65 of the locking member contacts the locking catch when the first folding table assembly 12 and the second folding table assembly 14 are brought together.

- 20 Determining the exact angle of the tabletops that define the preferred storage position involves balancing decreasing the stability of the folded table 10 in the storage position against decreasing the footprint (or effective storage area) of the foldable table 10. Generally, the smaller the foot print of the folded table 10 in the storage position the easier it is for the table to topple over. Once the preferred angle is chosen, the lock assembly 60 can be sized and attached to the support structure 30, at a location that ensures that the folding table 10 will always be stored at the preferred angle. Note that FIGS. 6-9 show a folding table 10 that

includes a standard use lock 80 that automatically locks the table in the use position. For more specific information regarding the use lock 80, refer to the references cited in the background.

Referring to FIG. 10 and 11, in contrast to storage, during shipping the primary concern is decreasing the space that the folding table 10 occupies. Accordingly, it is preferred that the lock assembly 60 that prevents the folding table 10 from over-folding be disengaged during shipping. The spring lock, or “spring loaded detent,” 76 serves such a function. When the spring lock 76 is disengaged, the sleeve 74 and the locking member 62 can rotate relative to the cross bar 72. Therefore, disengaging the spring lock 76 ensures that the handles 66 and 67 do not limit the rotation of the locking member 62. Accordingly, when the spring lock 76 is disengaged, the locking member 67 can be rotated to a more vertical position thereby allowing the first tabletop portion 22 and the second tabletop portion 24 to be brought in closer proximity. During shipping the first assembly 12 and the second assembly 14 of the folding table 10 can be held together with a common strap 82 shown in FIG. 11. Note that the stools 51 are not shown in FIG. 11, to further conserve space, the stools are preferably not attached to the folding table 10 during shipping.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.